CLAIMS

1. A composition for on-site forming gaskets which comprises 10% to 100% by weight of a vinyl polymer [polymer (I)] having at least one group represented by formula (1) per molecule at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), a cured product prepared by curing the composition having a compression set of 40% or less according to the definition of JIS K 6262.

2. The composition according to claim 1, wherein R^a is hydrogen or a hydrocarbon group having 1 to 20 carbon atoms.

3. The composition according to claim 2, wherein R^a is hydrogen or a methyl group.

4. The composition according to any one of claims 1 to 3, wherein the composition is used for sealing a portion required to have oil resistance.

5. The composition according to any one of claims 1 to 4, wherein the composition is used for sealing a portion required to have oil resistance and heat resistance.

6. The composition according to any one of claims 1 to 5, wherein the composition is used in the periphery of an automobile engine.

7. The composition according to any one of claims 1 to 6, wherein the composition is used for sealing an oil-pan bonding surface of an automobile.

8. The composition according to any one of claims 1 to 7

comprising 10% to 100% by weight of polymer (I), wherein a cured product of the composition showing higher oil resistance than that of a cured product from a composition containing a polymer which is prepared by substituting the repeat unit of the main chain of polymer (I) with butyl acrylate alone, in any one item of the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

9. The composition according to any one of claims 1 to 7 comprising 10% to 100% by weight of polymer (I), wherein a cured product of the composition showing a rate of mass change of 50% or less before and after immersion in the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

10. The composition according to claim 8 or 9, wherein a cured product of the composition shows a smaller change of mass than that of a cured product from a composition containing a polymer which is prepared by substituting the repeat unit of the main chain of polymer (I) with butyl acrylate alone in the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

11. The composition according to any one of claims 8 to 10, wherein a cured product of the composition shows a smaller change of volume than that of a cured product from a composition containing a polymer which is prepared by substituting the repeat unit of the main chain of polymer (I) with butyl acrylate alone in the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

12. The composition according to any one of claims 1 to 11, wherein polymer (I) is a (meth)acrylic polymer.

13. The composition according to any one of claims 1 to 12,

wherein polymer (I) is an acrylic polymer.

14. The composition according to any one of claims 1 to 13, wherein polymer (I) is an acrylate polymer.

15. The composition according to any one of claims 1 to 14, wherein polymer (I) comprises ethyl acrylate and/or an alkoxyalkyl acrylate as an essential constitutional unit.

16. The composition according to claim 15, wherein the alkoxyalkyl acrylate is 2-methoxyethyl acrylate and/or 2-ethoxyethyl acrylate.

17. The composition according to any one of claims 1 to 11, wherein polymer (I) is a styrene polymer.

18. The composition according to any one of claims 1 to 17, wherein polymer (I) is produced by the step of:

reacting a halogen group-terminated vinyl polymer with a compound represented by formula (2):

$M^{+-}OC(O)C(R^a)=CH_2$ (2)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms, and M^+ represents an alkali metal ion or a quaternary ammonium ion).

19. The composition according to claim 18, wherein the halogen group-terminated vinyl polymer is represented by formula (3):

$-CR^1R^2X$ (3)

(wherein R^1 and R^2 each represent a group bonded to an ethylenically unsaturated group of a vinyl monomer, and X represents chlorine, bromine, or iodine).

20. The composition according any one of claims 1 to 17, wherein polymer (I) is produced by the step of:

reacting a hydroxyl group-terminated vinyl polymer with a compound represented by formula (4):

$X^1C(O)C(R^a)=CH_2$ (4)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms, and X^1 represents chlorine, bromine, or a hydroxyl group).

21. The composition according any one of claims 1 to 17, wherein polymer (I) is produced by the step of:

(1) reacting a hydroxyl group-terminated vinyl polymer with a diisocyanate compound and then (2) reacting the residual isocyanate group with a compound represented by formula 5:

$HO-R'-OC(O)C(R^a)=CH_2$ (5)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms, and R' represents a divalent organic group having 2 to 20 carbon atoms).

22. The composition according to any one of claims 1 to 21, wherein the main chain of polymer (I) is produced by living radical polymerization of a vinyl monomer.

23. The composition according to any one of claims 1 to 21, wherein the main chain of polymer (I) is produced by polymerization of a vinyl monomer using a chain transfer agent.

24. The composition according to claim 22, wherein the living radical polymerization is atom transfer radical polymerization.

25. The composition according to claim 24, wherein the main chain of polymer is produced by the atom transfer radical polymerization of a (meth)acrylic monomer using an organic halide or halogenated sulfonyl compound as an initiator, and a metal complex as a catalyst, the metal complex having a VIII, IX, X, or XI group element in the periodic table as a central

metal.

26. The composition according to claim 25, wherein the transition metal complex used as the catalyst of the atom transfer radical polymerization is selected from complexes of copper, nickel, ruthenium, and iron.

27. The composition according to claim 26, wherein the transition metal complex is a copper complex.

28. The composition according to any one of claims 1 to 27, wherein polymer (I) has a number-average molecular weight of 3,000 or more.

29. The composition according to any one of claims 1 to 28, wherein polymer (I) has a ratio of the weight-average molecular weight to the number-average molecular weight determined by gel permeation chromatography of less than 1.8.

30. The composition according to any one of claims 1 to 29, which further comprises a monomer and/or oligomer having a radical polymerizable group.

31. The composition according to any one of claims 1 to 29, which further comprises a monomer and/or oligomer having an anionic polymerizable group.

32. The composition according to claim 30 or 31, which comprises a monomer and/or oligomer having a (meth)acryloyl group.

33. The composition according to claim 32, which comprises a monomer and/or oligomer having a (meth)acryloyl group and a number-average molecular weight of 5,000 or less.

34. The composition according to any one of claims 1 to 33, which further comprises a photopolymerization initiator.

35. The composition according to claim 34, wherein the photopolymerization initiator is a photoradical initiator.

36. The composition according to claim 34, wherein the photopolymerization initiator is a photoanion initiator.

37. The composition according to any one of claims 1 to 33, which further comprises a thermopolymerization initiator.

38. The composition according to claim 37, wherein the thermopolymerization initiator is selected from the group consisting of azo initiators, peroxides, persulfates, and redox initiators.

39. A gasket formed on site which is prepared from the composition according to any one of claims 1 to 38.

40. An on-site formed gasket which is produced by irradiating the composition according to any one of claims 34 to 36 with active energy rays.

41. The gasket according to claim 40, wherein the compression set according to JIS K 6262 is 30% or less.

42. The gasket according to claim 40, wherein the compression set according to JIS K 6262 is 20% or less.

43. The gasket according to claim 40, wherein the compression set according to JIS K 6262 is 15% or less.

44. An on-site formed gasket produced by thermally curing the composition according to claim 37 or 38.

45. The gasket according to claim 44, wherein the compression set according to JIS K 6262 is 30% or less.

46. The gasket according to claim 44, wherein the compression set according to JIS K 6262 is 20% or less.

47. A method for preparing a curable composition which comprises mixing 10% to 100% by weight of a vinyl polymer [polymer (I)] having at least one group represented by formula (1) per molecule at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), a cured product produced by curing the composition having a compression set of 40% or less according to JIS K 6262.

48. The method according to claim 47, wherein the curable composition is a composition for on-site forming gaskets.

49. A (meth)acrylic polymer produced by atom transfer radical polymerization, which has at least one group represented by formula (1) at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), a cured product prepared from the polymer showing higher oil resistance than that of a cured product from a composition containing a butyl acrylate homopolymer having the same structure in any one item of the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

50. A (meth)acrylic polymer produced by atom transfer radical polymerization, which has at least one group represented by formula (1) at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), a cured product prepared from the polymer showing a rate of mass change of 50% or less before and after immersion in the immersion test according to JIS K 6258 for the land use 3-5 lubricating oil specified in JIS K 2215.

51. The (meth)acrylic polymer according to claim 50, wherein a cured product of the polymer shows a smaller change of mass than that of a cured product from a butyl acrylate homopolymer having the same structure before and after immersion in the lubricating oil according to claim 49 or 50.

52. The (meth)acrylic polymer according to any one of claims 49 to 51, wherein a cured product of the polymer shows a smaller change of volume than that of a cured product from a butyl acrylate homopolymer having the same structure before and after immersion in the lubricating oil according to claim 49 or 50.

53. The (meth)acrylic polymer according to any one of claims 49 to 52, wherein the molecular weight distribution is less than 1.8.

54. The (meth)acrylic polymer according to any one of claims 49 to 53, wherein the main chain is an acrylic polymer.

55. The (meth)acrylic polymer according to claim 54, wherein the main chain is an acrylate polymer.

56. The (meth)acrylic polymer according to claim 54, wherein the acrylic polymer comprises ethyl acrylate and/or an alkoxyalkyl acrylate as an essential constitutional unit.

57. The (meth)acrylic polymer according to claim 56, wherein the alkoxyalkyl acrylate is 2-methoxyethyl acrylate and/or

2-ethoxyethyl acrylate.

58. The (meth)acrylic polymer according to any one of claims 49 to 57, which is produced by reacting a halogen group-terminated (meth)acrylic polymer with a compound represented by formula (2):

$M^{+-}OC(O)C(R^a)=CH_2$ (2)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms, and M^+ represents an alkali metal ion or a quaternary ammonium ion).

59. The (meth)acrylic polymer according to claim 58, wherein the halogen group-terminated (meth)acrylic polymer is represented by formula (3):

$-CR^1R^2X$ (3)

(wherein R^1 and R^2 each represent a group bonded to an ethylenically unsaturated group of a vinyl monomer, and X represents chlorine, bromine, or iodine).

60. The (meth)acrylic polymer according any one of claims 49 to 57, which is produced by reacting a hydroxyl group-terminated (meth)acrylic polymer with a compound represented by formula (4):

$X^1C(O)C(R^a)=CH_2$ (4)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms, and X^1 represents chlorine, bromine, or a hydroxyl group).

61. The (meth)acrylic polymer according any one of claims 49 to 57, which is produced by (1) reacting a hydroxyl group-terminated (meth)acrylic polymer with a diisocyanate compound, and (2) reacting the residual isocyanate group with a compound represented by formula (5):

$HO-R'-OC(O)C(R^a)=CH_2$ (5)

(wherein R^a represents hydrogen or an organic group having 1

to 20 carbon atoms, and R' represents a divalent organic group having 2 to 20 carbon atoms).

62. The (meth)acrylic polymer according to any one of claims 49 to 61, wherein the main chain is produced by the atom transfer radical polymerization of a (meth)acrylic monomer using an organic halide or halogenated sulfonyl compound as an initiator, and a metal complex as a catalyst, the metal complex having a VIII, IX, X, or XI group element in the periodic table as a central metal.

63. A curable composition which comprises, as essential components, (A) the (meth)acrylic polymer according to any one of claims 49 to 62 which is produced by atom transfer radical polymerization and has at least one group represented by formula (1) at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), and (B) a photopolymerization initiator.

64. A curable composition which comprises, as essential components, (A) the (meth)acrylic polymer according to any one of claims 49 to 62 which is produced by atom transfer radical polymerization and has at least one group represented by formula (1) at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms), and (B) a thermopolymerization initiator.

65. A composition for on-site forming gaskets which comprises the acrylic polymer according to any one of claims 49 to 62.

66. A molded product which is prepared from a curable composition containing the acrylic polymer according to any one

of claims 49 to 62.

67. A curable composition which comprises a (meth)acrylic polymer produced by atom transfer radical polymerization and having ethyl acrylate and/or an alkoxyalkyl acrylate as an essential constitutional unit and at least one group represented by formula (1) at its molecular end:

$-OC(O)C(R^a)=CH_2$ (1)

(wherein R^a represents hydrogen or an organic group having 1 to 20 carbon atoms).

68. The curable composition according to claim 67, wherein the alkoxyalkyl acrylate is 2-methoxyethyl acrylate and/or 2-ethoxyethyl acrylate.

69. The curable composition according to claim 67 or 68, which is used as a composition for on-site forming gaskets.